HIGH POINT PHASE I – GRADING AND INFRASTRUCTURE
SEATTLE, WASHINGTON
SECTION 02630
STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes, but is not limited to:
   1. Furnishing and installing catch basins, maintenance holes, cleanouts, storm drain pipes, fittings, service drains, storm drain structures, and related work and appurtenances as shown on the Contract Documents.
   2. Coordinating work with Seattle Department of Transportation (SDOT) and Seattle Public Utilities (SPU).
   3. Provide connections to existing public and private system
   4. Provide temporary connections and bypasses

1.2 REFERENCES

A. Reference the following standards:

COS 2003	City of Seattle 2003 Standard Specifications for Road, Bridge and Municipal Construction and City of Seattle 2003 Standard Plans
WSDOT 2004	Washington State Department of Transportation 2004 Standard Specifications and Plans for Road, Bridge, and Municipal Construction.
WISHA	Revised Code of Washington (RCW) Chapter 49.17
WAC 296-155	Washington Administrative Code (WAC) 296-155 Standards for Construction Work
RCW Chapter 39.04.180	RCW Chapter 39.04.180 Public Works/Trench Excavations – Safety Systems Required

1.3 RELATED SECTIONS

A. Coordinate related work specified in other parts of the Contract Documents, including but not limited to the following:

Section 02200 – Site Preparation
Section 02300 – Earthwork
Section 02660 – Pond Liner
Section 03300 – Concrete
Section 05500 – Metal Fabrications
Section 05521 – Pipe and Tube Railings
Section 05530 – Gratings

1.4 REGULATORY REQUIREMENTS

A. Comply with all applicable Federal, State and Local codes and safety requirements. If there are any conflicts among reference standards, the more stringent requirements shall govern.

1.5 PERMITS

A. Obtain and pay for Side Sewer permit, Street Use permit, and other permits as required in accordance with Section 01420 - References.

1.6 QUALIFICATIONS

A. Install all public storm drains by a side sewer Contractor registered with the Seattle Department of Transportation (SDOT)/SPU.

B. Thermal butt-fusion of HDPE pipe shall be installed by an experienced HDPE welder technician who is certified in the jointing of HDPE in accordance with Title 49 Code of Federal Register, Part 192.285.

1.7 DIMENSIONS AND LAYOUTS

A. Furnish, set, and mark all line location stakes as described in Section 01720. Assign a licensed surveyor for this work who will be on site at all times when work requiring control is being performed, together with all necessary equipment, supplies and instruments related thereto. This equipment and personnel must be available, at no additional cost to the Owner, for the purpose of verifying layout and certifying the accuracy of work on the site.

B. Complete a review of all COS and SHA records relative to the existing underground utilities. Avoid damage to these facilities. Restore all active, damaged utilities at own expense.

C. Notify the General Contractor immediately of underground utilities encountered, which are not shown on the Drawings or Owner's survey or record drawings.

D. All storm drains shall be installed by a COS approved and registered side sewer contractor. Submit documentation to general contractor verifying registration.

1.8 SUBMITTALS

A. Submit the following in accordance with Section 01300.
   1. Product data sheets and shop drawings for materials, including pipe, catch basins, maintenance holes, pumps, storm drain vaults, and cleanouts.
   2. Documentation verifying registration of side sewer contractor.
   3. Documentation verifying certification of HDPE welder as defined in paragraph 1.6.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Polyvinyl Chloride (PVC) Drain Pipe: conform to COS 2003 Section 9-05.1(5) with rubber gasket joints.
   1. Conform Perforated PVC pipe to COS Section 9-05.2(6) with rubber gasket joints.
   2. Provide connections to catch basins and inlets with AC or GPK manhole adapter or an approved equivalent product. Portland cement joints on pipe are prohibited.

B. Ductile Iron Pipe with restrained joints DIP (RJ): conform to COS 2003 Section 9-30.2(1).
   1. Conform restrained joints to COS 2003 Section 9-30.2(6).
   2. Use ductile or cast iron on fitting, meet the same requirements as the connecting pipe, and conform to COS 2003 Section 9-30.2(1). Saddles fastened to pipe with external bands shall not be acceptable on any new system.

3. Ductile Iron Pipe within pond embankment zone shall be encased with polyethylene in accordance with COS 2003 Section 7-11.3(6)B except bedding and backfill as noted on Drawings and in Section 02300 – Earthwork.

C. Ductile Iron Pipe without restrained joints (DI): conform to COS 2003 Section 9-05.13.
1. Culverts: Culverts shall be Ductile Iron Pipe per ANSI Class 52 with push-on joints. Culvert inlet and outlet ends shall be beveled.
2. Ductile Iron Pipe within pond embankment zone shall be encased with polyethylene in accordance with COS 2003 Section 7-11.3(6)B except bedding and backfill as noted on Drawings and in Section 02300 – Earthwork.

D. Concrete Pipe: conform to COS 2003 Section 9-05.1(1)
1. Connections to maintenance holes, catch basins and inlets shall be by mortar joint. Portland cement joints on pipe are prohibited.
2. Joint types utilized on concrete pipe shall be consistent within individual storm drain structure runs.

E. Fittings Couplings and Joints
1. Fittings shall be the same material as the pipe.
2. Tees on existing pipe and new connections to maintenance holes shall be connected by core drilling and flexible connections. Use Inserta-Tee fittings for connections to existing pipes or an approved equivalent product.
3. Pipe-to-pipe connections between pipes of differing material shall be made with a flexible, watertight gasketed coupling as manufactured by Romac, Caulder, or Fernco or approved equivalent product, unless noted otherwise.

F. Conductive warning tape: conform to Section 02300 - Earthwork.

G. Bedding: conform to Section 02300 - Earthwork.

H. Backfill: conform to Section 02300 - Earthwork

I. Cleanouts: conform to COS 2003 Section 7-19 and as shown on the Contract Documents.

J. Pond Liner: conform to Section 02660 – Pond Liner.

K. Pond Drain Rock: conform to Section 02300 – Earthwork.

L. Pond Bottom Geotextile: conform to Section 02660 – Pond Liner.

M. Pond Energy Dissipater Vault: shown on the Drawings.

N. Recirculation Pond Pump Station: shown on the Drawings.
1. Pond sump pump shall be a single system, ABS Model AFP 0841 pump or approved equivalent, with 3” diameter discharge, complete with liquid level switch as indicated. Set pump shutoff at the elevation indicated.
2. Pond sump pump maintenance hole shall be as shown on Drawings. Locking access hatch shall be LW Products Co. Model S-2 (A) 30” x 30” single leaf door for H20 loading or approved equivalent product.
3. Vault for check valves on force main shall be as shown on Drawings. Provide vault sump and drain line connected to storm drain system as shown on Drawings.
4. Check valve shall be sized per Drawings and shall be CLA-VAL Model 81-02~~1~~ (Flanged Globe) or approved equivalent product. Gate valve shall be sized per Drawings and in accordance with WSDOT 2004 Section 9-30.3(1).

O. 27th Ave SW and SW Juneau St. Energy Dissipater and Flow Splitter Vault: shown on the Drawings.

P. Stormwater Pond Emergency Overflow Risers: shown on the Drawings.

Q. Pond Maintenance Drain MH: shown on the Drawings.

R. Flow Control MH: shown on the Drawings

S. COS Concrete Maintenance Holes (MH) indicated on the Drawings shall conform to the COS 2003 Standard Plans and COS 2003 Section 7-05.
1. Maintenance holes: use precast with rubber gaskets.
2. Provide full and complete channels for MH w/o sumps.
3. Provide sumps for MH per plans.
4. Use Type 200 MH with Reinforced Base shown on Drawings for COS Type 200MH with cover greater than 20 feet and cover no more than 22 feet (from rim elevation to invert elevation).
5. Where designated on the Art plans, MH cover shall be per COS Std Plan 230 and locking per COS Type 230L except imprint on lid shall be as shown on the Art Plans with "STORM" imprinted on cover.

T. WSDOT Concrete Maintenance Holes (MH) indicated on the drawings shall conform to WSDOT 2004 Standard Plans and WSDOT 2004 Section 7-05.
1. WSDOT Type 3 MH shown on Drawings shall conform to WSDOT Standard Plan B-23c.
2. WSDOT Type 2 MH shown on Drawings shall conform to WSDOT Standard Plan B-23b.
3. Maintenance holes: use precast with rubber gaskets.
4. Provide full and complete channels for MH w/o sumps.
5. Provide sumps for MH per plans.
6. Where designated on the Art plans, MH cover shall be per COS Std Plan 230 and locking per COS Type 230L except imprint on lid shall be as shown on the Art Plans with "STORM" imprinted on cover.

U. Catch basins: conform to the COS 2003 Standard Plans noted on the Drawings and COS 2003 Section 7-05.
1. Install outlet traps conforming to COS 2003 Standard Plans No. 267.1.

V. Inlets: conform to COS 2003 Standard Plans as indicated on the Drawings and COS 2003 Section 7-05.
1. Metal frame and grate: conform to COS and be as specified on the Drawings.

W. Catch basin and maintenance hole ladders: conform to COS Standard Plans.

X. Corrugated High Density Polyethylene (HDPE) Pipe: use dual walled with smooth interior pipe wall and corrugated exterior as noted on Drawings with watertight joints.

Y. Smooth HDPE Pipe: use smooth exterior and interior pipe walls and as noted on Drawings.

Z. Slotted Storm Drain Pipe (SSD)
1. Use PVC per ASTM D 1785, SCH 40 with solvent welded joints for all slotted subsurface drains and fittings.
2. Slot the screen uniformly with slots placed perpendicular to the longitudinal axis of the pipe in straight rows. Make slots free from any sign of burning or abrasion. Use Farwest "Special Products Division" (1-800-438-3808) for pipe slotting or approved equal. Screen opening slot width shall be as shown on Drawings. Slot width tolerance shall be +0.005 to –0.015 inches.

3. Install pipe and screen true to line and grade and shall be free of cracks or defects. Clean the interior of the pipe of all dirt, excess water and other foreign material as the pipe laying progresses.
4. Install slotted pipe so that the solid half faces down, unless noted otherwise. Locate slots in accordance with the Drawings.
5. The storm drain pipe that connects SSD to storm drains shall be the same as structures SSD except that the pipe shall have solid walls.

AA. Tightlined Storm Drain Pipe (TSD): same material as SSD pipe except pipe shall be solid wall without slots.

BB. Beehive Frame and Grates: as specified on Drawings

CC. NDS Monitoring Systems:
1. PSDMH Flow Monitoring Station as shown on drawings.
   a. Flume in PSDMH:
      i. Use 24-inch cutback-exit type Palmer-Bowlus flume, including an integral approach section and a built-in cavity with support bracket for an electronic pressure transducer. Equip entrance and exit ends with bulkheads to fit into circular channel having the same radius as the pipe size in which it is installed. Equip the entrance end with a flared transition section to match the pipe size in which it is installed.
      ii. Flume must be of molded isophthalic polyester resin and fiberglass with minimum ¼-inch wall thickness and minimum 2-inch top flanges equipped with integral anchor clips with ½ inch diameter holes for mounting to concrete. Inside surfaces must have a smooth white gel-coat finish free of irregularities. Equip flume with fiberglass-reinforced bracing at top to maintain dimensional integrity during shipment, installation, and operation.
      iii. Mount 5-mil mylar, high visibility staff gauge graduated in tenths and hundredths of feet alongside the pressure transducer cavity.
      iv. Construct flume in multiple sections to allow installation in flow monitoring maintenance hole.
      v. Use: Manufacturer: Plasti-Fab, Inc. or approved equal.
   b. PVC Conduit shall be conform to COS 2003 Section 9-05.1(5) with rubber gasket joint
   c. Valve box with locking lid as shown on drawings.
   d. Concrete pad for cabinet as shown on drawings.

2. Block Scale Flow Monitoring Station: as shown on drawings.

DD. Subsurface drains for walls shall be perforated PVC per AASHTO M 278 and COS Section 9-05.2(6).

EE. Pipe Anchor: as shown on Drawings

FF. Pipe Guides: as shown on Drawings

GG. HDPE Wall Anchor: IPS Force Transfer/Restraint fitting as manufactured by ISCO Industries or approved equivalent product.

HH. Vandal Proof Hooded Vent Cap: as shown on Drawings.

2.2 TRENCH DRAINS

A. Trench Drains: use cast-in-place TF-14 Trench Drain Forming System by ABT, Inc. or an approved equivalent product and sized with the radius and slope as shown on the Drawings.
   1. Forms: use pre-engineered and factory fabricated expanded polystyrene with a smooth surface to create a smooth finish.
   2. Trench Drain rails: conform to ASTM A 36 post fabricated galvanized per ASTM A 123 with a minimum cross section of 1 ¾ inch by 3/16 inch and concrete anchors at 11 inches on center.
   3. Grates: use Class 35 ASTM 35 cast iron with a minimum 22 percent open space unless otherwise specified in the Drawings. Grates shall also:
      a. Conform to H20 load and ADA requirements.
      b. Be held in place with an approved locking mechanism.
   4. Trench Drain Headwalls: shown on the Drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. Verify location of existing utilities in accordance with Section 02200.

B. Make proper provisions to avoid interferences with installation of other work and/or other Contractors, prior to the construction. Make any changes caused by neglect to coordinate work as directed by the Owner's Representative and at no additional cost to the Owner.

C. Compare storm drainage drawings and specifications with drawings and specifications of other trades and report any discrepancies between the documents to the Owner's Representative prior to beginning work.

3.2 TRENCHING AND PIPE INSTALLATION

A. Excavation and preparation of the trench shall be in accordance with Section 02300 and 02200. All trenching shall conform to the Washington Administrative Code (WAC) 296-155 and WISHA requirements for Excavation, Trenching and Shoring.

B. Excavate trench and install pipe to alignments, elevations, grades and slopes indicated on the drawings.

C. Excavate and prepare trench in accordance with Section 02300. For work within the critical root zone, prepare trench in accordance with paragraph 3.2H2 in Section 01731.

D. Install pipe in conformance with COS 2003 Section 7-17.3(2).

E. Install conductive warning tape in accordance with Section 02300.

F. Mark ends of service drains with a 2x4 wood stud marked "STORM" in indelible markers. Maintain and preserve marked studs.

G. High Density Polyethylene pipe shall be joined by the method of thermal butt-fusion as outlined in ASTM D 2657 "Heat Joining Polyethylene Pipe and Fittings." All butt-fusion joining of pipe and fittings shall be performed in accordance with proven procedures and techniques recommended by the manufacturer. Thermal butt-fusion of the pipe shall be performed by an experienced technician, certified in the jointing of HDPE in accordance with Title 49 CFR 192.283. Bends in the pipe shall not exceed the radius specified by the pipe manufacturer for the type, size and

SDR used.

H. PIPE JACKING OF STORM DRAIN PIPE INSTALLATION WITHIN CRITICAL ROOT ZONE OF TREES TO SAVE

1. Storm drain pipe installed within critical root zone of trees to save shall be installed by pipe jacking, augering, or tunneling subject to approval by Owner's Representative.

2. Jacking of the pipe shall be in accordance with COS 2003 Section 7-17.3(2)J.

3. No open trenching for installation of storm drain pipe shall occur within the critical root zone of the tree without written authorization from Owner's Representative.

3.3 CATCH BASIN, MAINTENANCE HOLES AND STRUCTURE INSTALLATION

A. Install catch basins, maintenance holes (MH) and structures in accordance with COS 2003 Section 7-05.3 and the Contract Documents.

B. Adjust existing maintenance holes to remain in accordance with COS 2003 Section 7-05.3(1)P & 7-05.3(2).

C. Rebuild existing maintenance holes to remain in accordance with COS 2003 Section 7-05.3(1)U.

D. Adjust existing catch basins and inlets to remain in accordance with COS 2003 Section 7-05.3(2).

3.4 TRENCH DRAIN INSTALLATION

A. Install trench drain in accordance with manufacturer's instructions.
1. Do not pour concrete into forms until the Owner's Representative has viewed the forms in place.
2. Pour concrete continuously. Do not pour against cold joints.

B. Slope trench drain as indicated on the Drawings.

3.5 BEDDING AND BACKFILLING

A. Place and compact bedding and backfill in conformance with Section 02300.

3.6 CLEANING AND TESTING

A. Clean and test storm drain in conformance with COS 2003 Section 7-17.3(4).
1. Require the new storm drain system pass tests required by the City of Seattle prior to final acceptance of the project.
2. Replace side sewers that do not pass tests as directed by the Owner's Representative and at no additional cost to the Owner.
3. Perform television inspection and videotaping, and provide associated reports and video tapes
   a. Submit an individual videotape cassette for each structure-to-structure pipe run.
   b. Perform first complete run upon installation of pipe but prior to abandoning bypass.
   c. Perform second run prior to project closeout to verify pipes are undamaged.
   d. Repair and/or replace pipe runs identified as nonconforming to the specifications and as directed by the Owner's Representative at no additional cost to the Owner.

3.7 PERMANENT CONNECTIONS TO EXISTING MAINS

A. Make permanent connections to existing storm drain systems where indicated on the Drawings.

B. Replace existing pipe and/or add fittings and pipe as necessary here existing pipe is to be connected to a new structure to provide an approved connection per the Drawings.

C. Rebuild structure where new pipe is to be connected to an existing structure as necessary to provide an approved connection per the Drawings. Rechannel the structure.

3.8 NDS Monitoring Systems:

1. Schedule installation at least 1 week in advance with Owner's Representative.
2. Install flume in channeled maintenance hole in accordance with manufacturer's instructions. Flume must be installed plumb and level both laterally and longitudinally. Provide smooth transitions between flume and pipe in which it is mounted.
3. Following installation, clean all surfaces in accordance with the manufacturer's instruction and remove all trash and debris from maintenance hole.

END OF SECTION 02630